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after sunset, — the progress of their region of occurrence across the country corresponding to the passage of the broad cyclonic storm that gave them birth. The signal-service report states that about a thousand persons were killed, more than twice as many wounded, and three or four million dollars' worth of property destroyed, by these storms on this single day. This was the first and severest visitation of the year.

The distinguishing mark of the tornado is its dark, pendent funnel-cloud at the centre of the most violent winds. The rules published by the signal-service for escaping from such a storm, when it is seen approaching, are based on the regularity with which tornadoes move to the north-east, or at least to some point between east and north, along a tolerably straight course, at a rate of about thirty



FIG. 2.

miles an hour. If seen to the north-west or south-east, the tornado will, in all probability, pass to one side of the observer. If seen in the south-west, a few moments' watching will serve to discover whether the funnel-cloud is advancing so as to pass north-west or south-east of the observer; then, without waiting too long, let him run to the open side. If the funnel-cloud seems to come directly toward the observer, he should run to the north-west, because the winds on that side are a little less violent than on the other, and the chance of escape there is correspondingly better. In regions where tornadoes occur frequently, every

house should be provided with an underground chamber or dug-out, easily reached, and guarded by a strong grated door. This is the only retreat on the storm-path in which safety can be found. The effect of a tornado on the buildings of a western town is seen in fig. 2, copied from a photograph taken by D. H. Cross at Grinnell, Io., shortly after its destruction on June 17, 1882.

### BLOOMING-TIMES FOR FLOWERS.

*"And 'tis my faith that every flower  
Enjoys the air it breathes."*

WORDSWORTH.

THE pressure brought to bear on every branch of industry in this rapidly moving nineteenth century has not failed to produce its effect on students of natural history; and comparatively few of the present active workers find time to leisurely ramble, observe, and philosophize, as, for example, Gilbert White did a century ago. Yet there is scarcely a lover of nature, however closely confined to his study or laboratory, who does not listen for the first twitter of the bluebird, or delight in the first bunch of violets brought by the spring, and find himself cheered by the chirp of the last robins, and the flowers of the witch-hazel, on the threshold of winter. For such and all lovers of nature, this effort to indicate the usual time at which a few typical plants of the different seasons may fairly be said to be coming into full bloom is made as a reminder of seasons that are gone, and a prompter for those to come.

Like the birds, flowers vary much in their habits. Some stay with us through the entire open season, and push their heads up at the very edge of the snow or in the heat of midsummer; some come at their appointed time, last but a few days or weeks, and disappear completely, be the season what it may; and others, usually regular in their blooming, feel the stimulus of a long, warm autumn, like the last, and anticipate the following spring by unfolding more or less profusely.

Every region has its own climatic peculiarities and its proper spring and autumn; and, though the limits of these may vary somewhat from year to year, there is usually some close observer of nature to be found, who prides himself on knowing a sheltered place where he is certain to find the trailing-arbutus or pasque-flower at about the same

date every year. But one spray of arbutus does not make a spring, and the lovely May-flower may not reach its prime of beauty and fragrance for some time after the most sheltered plants open their buds. Even in the same neighborhood, differences in exposure and elevation defy an exact tabulation of the periods of leafing, flowering, and fruiting; and the moderating influence of a body of water may retard the blooming of early species in its immediate vicinity for days or even weeks.

In a country covering nearly twenty-five degrees of latitude and fifty-five of longitude, with lofty mountains and tablelands and low valleys, diversified by great lakes and rivers, and embracing every variety of climate from the subtropical to the subarctic, with excesses of humidity in one region and of drought in another, it is impossible to arrange the phenomena of the seasons so as to include the whole.

On comparing the data obtainable, however, a few general features are found common to a great part of the country. Whatever their exact date of leafing or flowering may be, there are certain genera — like the maples, poplars, and elms among trees, and the violets and wakerobins among herbs — that precede most of their fellows; and, except in very anomalous seasons, their species succeed each other with the same regularity. Where the same plant extends from the Gulf to New England, it naturally blooms earlier in the warmer region; but it is noticeable that the difference, greatest in the flowers of early spring, becomes less marked as the season advances, under the accelerating heat of the northern summer, so that there is often little difference in the flowering of summer and autumnal plants. In general the same rule applies to species occurring over a considerable range of altitude, and is now and then illustrated nicely by a species with a wide distribution on both high and low ground.

#### FLORAL CALENDAR.<sup>1</sup>

*Blooming all the year in favorable seasons.* —

Chickweed, dandelion (N.), Cherokee rose (Al.), Eschscholtzia, Anagallis (Cal.).

Jan. 1–10. — Ranunculus californicus (Cal.).

Jan. 10–20. — Ribes sanguineum (Cal.).

Jan. 20–30. — Red cedar (Al.).

Feb. 1–10. — Scoliopus (Cal.), red maple (Al.), Salix scouleriana (O.).

<sup>1</sup> Based on the notes of Dr. Mohr for Mobile, Ala. (Al.); Professor Porter for middle Colorado (3–6,000 feet, Col.; 8–10,000 feet, Col.); Mr. Rattan for San Francisco, Cal. (Cal.); Mr. Hay for St. John, N.B. (C.); Mr. Howell for Oregon (O.); and the writer for Wisconsin and New York (N.).

Feb. 10–20. — Trillium ovatum (Cal.), wild plum, trailing-arbutus (Al.).

Feb. 20–28. — Choke-berry, blue violet (Al.), Dentaria (O.).

March 1–10. — Cottonwood, sassafras (Al.), Nemophila Menziesii, Viola pedunculata (Cal.), Trillium ovatum (O.).

March 10–20. — Oaks, Pinus taeda (Al.), Phacelia tanacetifolia, Nemophila aurita (Cal.).

March 20–30. — Locust, flowering dogwood (Al.), Gilia multicaulis (Cal.), Ribes sanguineum (O.).

April 1–10. — Violets, Gilia achilleaefolia (Cal.), magnolia, wild cherry, Oxalis violacea (Al.), skunk-cabbage (N.).

April 10–20. — Gilia androsacea (Cal.), hickories (Al.), red maple, cottonwood, red cedar, pasque-flower (N.), Delphinium bicolor (Col.), Nardosmia palmata (C.), Erythronium (O.).

April 20–30. — Ceanothus thyrsiflorus (Cal.), poison sumach, blue flag (Al.), trailing-arbutus, sugar-maple (N.), Thlaspi alpestre (Col.), spring beauty (C.).

May 1–10. — Calochortus alba (Cal.), smooth sumach (Al.), ash, spring beauty, Erythronium, Trillium, golden currant (N.), spring beauty, pasque-flower (Col.), Clematis Douglasii (Col.).

May 10–20. — Calochortus Weedii (Cal.), sun-dews, New-Jersey tea (Al.), blue violet, wild plum, wild cherries (N.), Viola Nuttallii (Col.), Mertensia alpina (Col.), trailing-arbutus (C.).

May 20–30. — Calochortus pulchella (Cal.), sweet bay, dwarf palmetto (Al.), barberry, oaks, apple (N.), spring beauty (Col.), Trillium (C.).

June 1–10. — Lilium pardalinum (Cal.), St. Johns worts (Al.), blue flag, choke-berry (N.), Sophora sericea (Col.), golden currant (Col.), Calypso (C.).

June 10–20. — Mentzelia laevicaulis (Cal.), Virginia-creeper (Al.), raspberry, locust (N.), Lepachys columnaris (Col.), Anemone multifida (Col.).

June 20–30. — Rosa carolina (Al.), laurel, sun-dews, Aquilegia coerulea (N.), Delphinium azureum, Gilia aggregata (Col.), Zygadenus glaucus (Col.), Cypripedium acaule (C.).

July 1–10. — Sabbatia, Aster paludosus (Al.), Virginia-creeper, Rosa carolina (N.), Cleome integrifolia (Col.), pasque-flower (Col.).

July 10–20. — Gentiana oregana (Cal.), Habenaria ciliaris (Al.), New-Jersey tea, smooth sumach (N.), Pentstemon glabra (Col.), Gilia aggregata, Viola canina (Col.), Habenaria pycnodes (C.).

July 20-30. — *Rhexia*, *Zygadenus* (Al.), poison sumach (N.), *Grindelia squarrosa* (Col.), *Aquilegia coerulea* (Col.), *Lilium canadense* (C.).

Aug. 1-10. — *Zauschneria* (Cal.), *Petalostemon corymbosum* (Al.), *Sabbatia*, *Habenaria ciliaris* (N.), *Helianthus petiolaris* (Col.), *Erythronium grandiflorum* (Col.), *Rubus villosus* (C.).

Aug. 10-20. — *Chrysopsis mariana* (Al.), sun-flowers (N.), *Malvastrum coccineum* (Col.), *Aster canescens* (Col.), *lovage* (C.).

Aug. 20-30. — *Lilium catesbaei*, *Liatris elegans* (Al.), *Solidago altissima* (N.), *Solidago missouriensis* (Col.), *Gentiana Parryi* (Col.), *Impatiens* (C.), *Aster Douglasii* (O.).

Sept. 1-10. — *Nabalus Frazeri* (Al.), beech-drops, *Liatris*, Indian pipe (N.), *Aster spectabilis* (C.), golden-rods (O.).

Sept. 10-20. — Golden-rods (Al.), golden-rods, sow-thistle, *Nabalus Frazeri* (N.) (C.).

Sept. 20-30. — *Gerardia purpurea* (Al.), gentians, *Acalypha* (N.).

Oct. 1-10. — *Aster tradescanti* (Al.), asters (N.).

Oct. 10-20. — *Gentiana ochroleuca* (Al.).

Oct. 20-30. — *Gentiana elliotii* (Al.).

Nov. — *Spiranthes brevifolia* (Al.), witch-hazel (N.).

### IMPORTANT AGRICULTURAL STATISTICS.

Live-stock in the United States in 1880, excluding ranch-stock, horses, mules, cows, and swine in cities, and those belonging to persons not owning or occupying farms.

Horses . . . . .	10,357,981	Sheep . . . . .	35,191,656
Cows (milk) . . . . .	12,443,593	Swine . . . . .	47,687,951
Other cattle . . . . .	22,488,590		

The leading states in the raising of live-stock are as follows.

Illinois, horses . . . . .	1,023,082
New York, milk-cows . . . . .	1,437,855
Texas, other cattle . . . . .	3,387,967
Ohio, sheep . . . . .	4,902,486
Iowa, swine . . . . .	6,034,316

Average yield per acre of cereals in the United States, 1880.

	Bush.		Bush.
Indian corn . . . . .	28+	Barley . . . . .	22+
Wheat . . . . .	13-	Rye . . . . .	10+
Oats . . . . .	25+	Buckwheat . . . . .	14-

Cereals raised in the United States in 1880.

	Bush.		Bush.
Indian corn . . . . .	1,754,861,535	Barley . . . . .	44,113,495
Wheat . . . . .	559,479,505	Rye . . . . .	19,831,595
Oats . . . . .	407,858,999	Buckwheat . . . . .	11,817,327

The leading states in the production of cereals.

	Bush.		Bush.
Illinois, Indian corn . . . . .	325,793,481	Iowa, oats . . . . .	50,610,591
Iowa, Indian corn . . . . .	275,024,247	New York, oats . . . . .	37,575,506
Missouri, Ind'n corn, 202,485,721		Pennsylvania, oats . . . . .	33,841,439
Indiana, Indian corn, 115,482,300		Wisconsin, oats . . . . .	32,905,320
Ohio, Indian corn . . . . .	111,877,124	California, barley . . . . .	12,579,561
Kansas, Indian corn, 105,729,325		Wisconsin, barley . . . . .	5,043,118
Illinois, wheat . . . . .	51,110,503	Pennsylvania, rye . . . . .	3,683,621
Indiana, wheat . . . . .	47,284,855	Illinois, rye . . . . .	3,121,785
Ohio, wheat . . . . .	46,014,869	New York, rye . . . . .	2,634,690
Michigan, wheat . . . . .	25,552,543	Wisconsin, rye . . . . .	2,298,513
Minnesota, wheat . . . . .	34,601,030	New York, buck-wheat . . . . .	4,461,200
Iowa, wheat . . . . .	31,154,205	Pennsylvania, buck-wheat . . . . .	3,573,326
California, wheat . . . . .	29,017,707		
Illinois, oats . . . . .	63,189,200		

Average yield of corn and wheat per acre (in bushels).

	Corn.	Wheat.
Alabama . . . . .	12+	6-
California . . . . .	27+	15+
Massachusetts . . . . .	35+	16+
New York . . . . .	33+	15+
Illinois . . . . .	36+	16-
Pennsylvania . . . . .	33-	13+
Florida . . . . .	9-	5+
Georgia . . . . .	9+	7-
Minnesota . . . . .	33+	11+

### Implements and workmen.

Agricultural implements, number and value (1880).

Number of establishments . . . . .	1,943
Number of hands employed . . . . .	39,580
Capital invested . . . . .	\$62,109,668
Wages of workmen . . . . .	15,359,610
Value of material . . . . .	31,531,170
Value of implements manufactured . . . . .	68,640,486
Number of reapers and mowers manufactured . . . . .	162,337
Number of grain-cradles manufactured . . . . .	167,492
Number of scythes manufactured . . . . .	1,244,264
Number of horse-rakes manufactured . . . . .	95,625

### Farms.

Number of farms in the United States in 1880, 4,008,907.

States then having 200,000 and upwards.

Illinois . . . . .	255,741	Missouri . . . . .	215,575
Ohio . . . . .	247,189	Pennsylvania . . . . .	213,541
New York . . . . .	241,058		

### Cotton raised in 1880.

Total in the United States, 5,735,257 bales of 475 pounds each.

States producing 500,000 bales and upwards.

	Bales.		Bales.
Mississippi . . . . .	955,808	Arkansas . . . . .	608,256
Georgia . . . . .	814,441	South Carolina . . . . .	522,548
Texas . . . . .	803,642	Louisiana . . . . .	508,569
Alabama . . . . .	699,654		

The extremes of production are Missouri,  $\frac{6}{100}$  of a bale; Florida,  $\frac{22}{100}$  per acre.